

Yang Miao

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Educational Background

- 09/2021- Master in Robotics, System and Control, ETH Zurich, GPA **5.83/6**
2016-2020 B.Eng. in E.E. and Automation, Harbin Institute of Technology, GPA 96.9/100 (**Top 1/289**)
2019 Visiting student, University of California, Berkeley, GPA **4.0/4.0**

Research Experiences

11/2023- Visual Localization to 3D Scene Graph Research Assistant

Keywords: Cross-modal localization; 3D scene graph; Multi-modal embedding; Contrastive Learning;

Supervisor: Dr. Dániel Béla Baráth, Dr. Francis Engelmann, Dr. Olga Vysotska at CVG Lab, ETHZ

1. Proposed a novel challenge of cross-modal localization of a query image within 3D scene graphs.
2. Leveraged multiple modalities of scene graph (object-level point cloud, image, attributes and relationship between objects) for object embedding in the scene graph.
3. Contrastive learning for a shared embedding space for objects in query images and in 3D scene graph.
4. Publication: In submission to ECCV 2024, code and preprint will be released soon.

10/2022-10/2023 Panoptic SLAM with Semantic and Geometric Consistency ([Github](#)) Master Thesis

Keywords: 3D panoptic mapping; semantic-aided localization; C++; python; ROS; PyTorch

Supervisor: Dr. Iro Armeni, Dr. Dániel Béla Baráth, Prof. Dr. Marc Pollefeys at CVG Lab, ETHZ

Phase 1: Incremental Panoptic Mapping

1. **Publication:** [arXiv](#), [video](#) (submitted to IROS 2024)
2. Developed algorithms which incrementally builds 3D panoptic map with RGB-D frames;
3. **Outperforms** existing 2D-3D semantic-instance mapping method with estimated trajectory.

Phase 2: Semantic-aided Localization (transferred to next project)

1. Improved ORB-SLAM3 and Voxgraph with panoptic information.
2. Explored place recognition with panoptic information, which led to “Visual Localization to 3D Scene Graph”.

04/2022-10/2022 Visual Odometry with New Unprecedented Event Camera ([Github](#)) Research Assistant

Keywords: visual odometry; event camera; feature tracking; ROS; C++; Ceres

Supervisor: Nico Messikommer, Daniel Gehrig, Prof. Dr. Davide Scaramuzza at RPG Lab, UZH

1. Developed feature tracking algorithms for new event camera with events with absolute intensity value.
2. **Outperforms** existing methods.
3. Grants Oculi sensor (low resolution) feature tracking accuracy **comparable to** Realsense(high resolution).

02/2022-06/2022 Automatic large-scale 3D data acquisition Research Assistant

Keywords: autonomous exploration; NeRF; C++; ROS; PyTorch

Supervisor: **Prof. Dr. Fisher Yu, Dr. Kumar** at Visual Intelligence and Systems Lab, ETHZ

1. Developed an algorithm allowing robot to automatically collect large-scale 3D RGB-D and Lidar data.
2. Employed depth-supervised NeRF to reconstruct the 3D scene.

Industry Research Experiences

06/2020-06/2021 3D Computer Vision for Automation of Port Operations Research Assistant

Keyword: pointclouds processing for Lidar; pose estimation; pattern recognition; ROS; C++

Supervisor: **Prof. Zhan Li** - Intelligent Control Lab, Harbin Institute of Technology

1. **Publication:** Y. Miao et al, “A Novel Algorithm of Ship Structure Modeling and Target Identification Based on Point Cloud for Automation in Bulk Cargo Terminals,” *Measurement and Control 2021* ([PDF](#))
2. Developed and **deployed** a system for hatch recognition and pose estimation of cargo ships at **Tianjin Port**.